Problem 3.12: Trigonometric Identities and Complex Exponentials

Show the following trigonometric identities using complex exponentials. In many cases, they were derived using this approach.

1. $sin\,(2u) = 2sin\,(u)\,cos\,(u)$
2. $cos^2(u) = \dfrac{1 + cos(2u)}{2}$
3. $cos^2(u) + sin^2(u) = 1$
4. $\dfrac{d}{du}(sin(u)) = cos(u)$

Figure 3.61Problem 3.13: Transfer Functions

Find the transfer function relating the complex amplitudes of the indicated variable and the source shown in Figure 3.60. Plot the magnitude and phase of the transfer function.

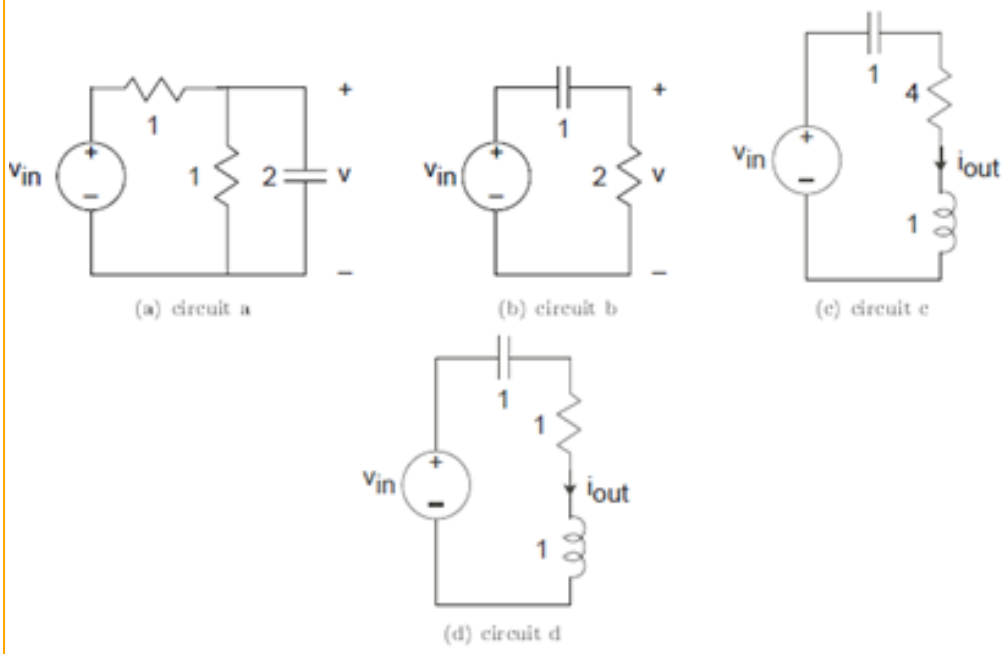

Figure 3.60 Transfer Function